

XIII. ON THE SUPPOSED OCCURRENCE OF
THE MIOCENE GENUS *FOSSARULUS*
RECENT IN INDIA.

By LT.-COL. H. H. GODWIN-AUSTEN, F.R.S.

In the *Fauna of British India, Mollusca, Freshwater Gastropoda and Pelecypoda*, Mr. H. B. Preston, on page 78, places *Bithynia costigera*, Küster (= *marginata*, Chm.) in the fossil genus *Fossarulus*, following Geoffrey Nevill in his "*Hand-List*," Vol. II, p. 42, with a ?. Having recently been looking over Indian species of *Bithynia* in my own and the Natural History collection this generic position has been brought into question. It appeared to me to be so impossible that a fossil genus of Miocene age and European habitat should be still living in Peninsular India. I sought Mr. Bullen Newton's kind help, and he was able to not only show me a *Fossarulus* but the type of the genus from Dalmatia quoted by G. Nevill. The first glance cleared up a great deal, and showed how great was the difference between the Recent and Fossil shells, in every important character. It is surprising that Nevill came to the conclusion he did in 1884. He may have had grounds at the time for doing so, certainly at the time he was at work he did not have in Calcutta the type shell of *Fossarulus* to refer to. Mr. Preston has perpetuated Nevill's determination, when the means of verification were close at hand in the Natural History collection.

To show the difference in question I give the original description of both the genus and its type.

Fam. PALUDESTRINIDAE.

Fahrbuch der Kaiserlich-Königlichen Geologischen Reichsanstalt, Wien, XIX, p. 361, pl. xii, figs. 7a-c.

"*Fossarulus novum* genus. Testa parva, subglobosa, rimata, longitudinaliter nodoso-costata; apertura late ovata, superne et ad basin effusa; peristomate continuo, incrassato, duplicato."

"Type *Fossarulus stachei*, Miocene, Dalmatia.

"Schale annähernd kugelig, fest, mit einer Nabelspalte versehen, aus 4 stark gewölbten Umgängen bestehend, von welchen der letzte fast $\frac{2}{3}$ der Gesamthöhe einnimmt; obere Windungen mit 3, die letzte mit 5 kräftigen, geknoteten Längsrippen verziert; Naht vertieft; Mundöffnung breit eiförmig, oben und unten mit einem kleinen Ausguss; Mundränder stark verdickt, doppelt, zusammenhängend. Grössenverhältniss des abgebildeten Exemplares: Höhe 7 mm. Durchmesser 5 mm."

Bithynia costigera is a small shell differing considerably from the common, widely spread, smooth form in having ribbing on the whorls: *vide* figure in *Conchologia Indica*, plate 151, fig. 10. The generic distinction is indicated even on shell character and is also to be expected in the animal, which should be examined. It does not occur in Bengal as stated by Preston. At least I have never met with specimens from the Gangetic delta. It is a common shell in Peninsular India, recorded by Nevill in his *Hand-List* from Karnul, Coujeveram and S. India (30) *ex*. W. T. Blanford and Madras Museum collections; also from Ceylon (30) *ex*. F. L. and F. Layard coll., together with a subvar. *curta*, G. Nevill, obtained by him at Bangalore.

The Blanford collection presented to the British Museum contains specimens from South India named *B. sulcata*, Eyd. and Soul.

As it was so important that the animal of *Bithynia costigera* should be examined I asked my friend Dr. N. Annandale if he could

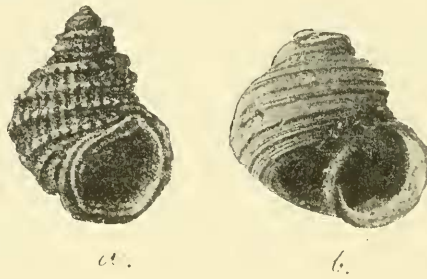


FIG. 1a.—*Fossarulus stachei*, Neumayer.
(Enlarged from Neumayer's original figure).

FIG. 1b.—*Mysoria costigera* (Küster) var. *curta* (Nevill).
(Enlarged photograph ($\times 4$) of shell from type locality).

help me. This he has not only been able to do, but he has most kindly had photographs and drawings made of the shell, radula, and operculum, together with an enlarged photo of Neumayer's original figure of *Fossarulus stachei*, which now illustrates this paper,—for which I thank him much.¹

I cannot do better than give in full the result of his examination of specimens he had collected at Bangalore, the original locality of var. *curta*, Nevill; for they add much to the value of this communication, and confirm my idea we are dealing with a new genus of freshwater shells very distinct from *Bithynia*. For this the name *Mysoria* seems applicable, if it has not been used

¹ Since this was written I have obtained fresh specimens of *M. costigera* in the neighbourhood of Madras. The animal, so far as appears on a superficial examination, does not differ from that of *Bithynia* except in having shorter tentacles. As, however, I am just starting on a long journey I have not been able to make a detailed examination. I hope that Col. Godwin-Austen will do this later and publish the results. N. Annandale, 8-x-1918.

before. This interesting species has a limited range in Southern India, which was a land surface in pre-Cretaceous times, during which its early development possibly took place.

Mysoria, gen. nov.

Type: *Bithynia costigera*, Küster, var. *curta*, Nevill.

Range. South India and Ceylon.

Shell perforately rimate, ovately conical or depressedly conical, solid, longitudinally striate, having 3 markedly birate ribs above with 2 below the periphery, aperture sub-circular, continuous; peristome simple, somewhat thickened on the columella side. Operculum not like that of *Bithynia*. Calcareous, not very thick, sub-circular or broadly ovate, centre concave, nucleus small with indication of spiral origin

Radula. Centre tooth quadrate with a centre cusp and 3 or 4 adjacent. Lateral tooth elongate, narrow at base gradually widening to a many cusped straight edge. First marginal of same length,

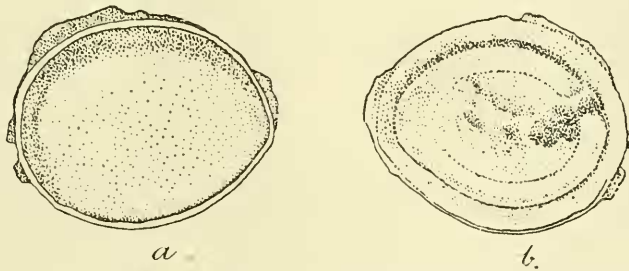


FIG. 2.—*Mysoria costigera* (Küster) var. *curta* (Nevill).
Operculum, $\times 8$. a. Internal view. b. External view.

narrower, edge finely serrate; 2nd same length, narrow throughout, edge rounded, finely serrate.

Touching Dr. Annandale's reference (see below) to the genus *Cremanoconchus* there is certainly in *C. syhadrensis*, W. Blf. from Bombay a very curious resemblance, so much so that an examination of its radula and other parts of the animal is much wanted, although William Blanford gave a very good account of it, it remains to be properly dissected. I am in hopes Dr. Annandale¹ will be able to do this, and better define the position of this genus, with its peculiar amphibious habits.

Under date 15th June, Calcutta, Dr. Annandale writes to me :
"I have examined the radula and the operculum of my specimens of *Bithynia costigera* var. *curta*, and enclose a note upon them. Have you noticed the extraordinary superficial resemblance be-

¹ Since this was written Dr. Bani Prashad and I have published notes on and figures of this species. See *Rec. Ind. Mus.* XVI, pp. 148, 149, pl. iv, figs. 2-4 (1910). N. Annandale, 16-ii-19.

tween the species and *Cremnoconchus*. . .” and proceeds to describe the var. *curta*.

“The specimens I have examined particularly were collected by myself at the edge of a tank near Bangalore some years ago. They belong to the var. *curta*, Nevill, and differ from the typical form not only in being rather shorter, with the spire less exerted, but also in having a chestnut-brown epidermis. The operculum is sub-circular or broadly ovate. It differs considerably from that of any species of *Bithynia* with which I have been able to compare the specimens, but closely resembles that of the new genus *Pseudovivipara* from China which I am describing in the “Memoirs of the Asiatic Society of Bengal.”¹ Externally it is covered with a thick brownish epidermis and varies considerably in appearance in accordance with the age of the specimen. In large shells it is always more or less eroded, and there are as a rule at least two areas marked off by concentric ridges. The centre is always concave and numerous concentric

striae can be detected on the surface if it is not eaten away. The nucleus is small and has a slight indication of spiral origin. The substance of the operculum is calcareous and, though not very thick, white and porcellaneous. The inner surface is convex and smooth, without sculpture. It has a raised margin forming the outer wall of a rather deep peripheral groove. This raised margin is, however, very delicate and apt to be destroyed in removing the operculum.

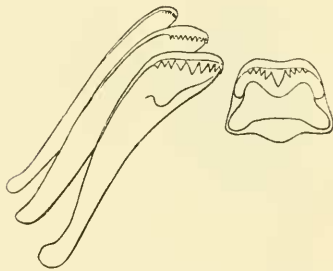


FIG. 3.—*Mysoria costigera* (Küster)
var. *curta* (Nevill).
Radula teeth, $\times 250$.

The radula in general structure resembles that of *Bithynia*, but the central tooth differs in three important points:—(1) there are no basal denticulations, (2) there is a single lateral denticulation on each side, connected by a continuous ridge with a central prominence on the disk of the blunt finger-shaped tooth, (3) the base of the tooth is turned upwards in the middle to form a broad process directed opposite to that of the anterior denticulations. The central tooth is very small compared with the others.

These features of the radula and operculum probably indicate that the species should be made the type of a new genus. Unfortunately the soft parts of my specimens are not sufficiently well preserved to show anything except that the foot is relatively short and certainly not bifid.”

This radula is a very different one to that of *Bithynia tentaculata* (fig. 4), which I have looked at and drawn. It shows beyond doubt the generic value of *Mysoria*. A glance at the central tooth

¹ Annandale, *Mem. As. Soc. Bengal*, VI, pp. 309-312, pl. x, figs. 3, 3a (1918).

shows how distinct the two genera are. They cannot be placed in the same family. If the living animals of the Palaearctic and South Indian species could be looked at side by side I imagine they would differ considerably one from the other. In drawings of *Bithynia tentaculata* I made many years ago, the tentacles are shown to be very long and finely pointed.

A figure of the radula of this species, the type of the genus, is given by Dr. Paul Fischer in *Manuel de Conchyliologie*, p. 723; he alludes to and shows what he calls "basal denticulations." These are rather nearer to the marginal edge of the tooth, a folding over of the same, and would appear to represent lateral cusps—an indication I think I have seen put forward by some writers that

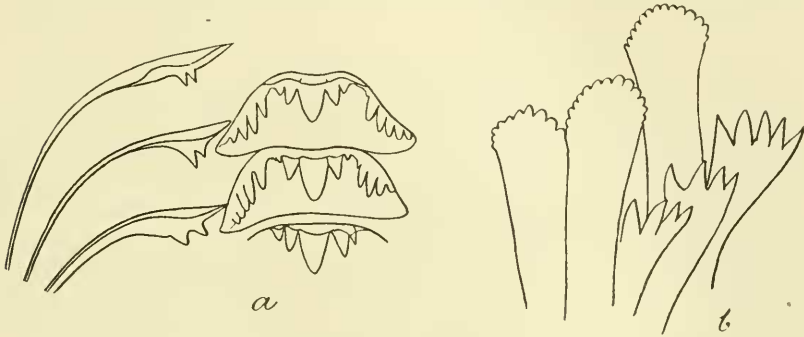


FIG. 4.—*Bithynia tentaculata*, Linn.

a. Centre and median teeth of radula, $\times 360$. In the first are seen the "basal denticulations" representing the marginal cusps by the folding over of the margin; in the second the teeth are seen from the side.

b. The two marginal teeth, $\times 360$.

the central tooth of these operculates was originally a series of separate teeth now merged together.

The radula of other species of Indian *Bithynia*, that of *kashmirensis* for instance, should be looked at; they may not all be like that of *B. tentaculata*. Dr. Annandale has kindly sent me for perusal his valuable notes on "The Aquatic Mollusca of the Inle Lake and connected waters, Shan States." He includes the species collected of Nevill's genus *Hydrobioides*. He says the radula is like that of *Bithynia*, but with no further detail. This, however, is made good by excellent figures of the radulae of *H. nassa*, Theobald and two new species (plate xiv, figs. 4, 4*a*; 2*c*; and 5). These show the basal denticulations of the central tooth, so typical of *Bithynia*, present in every case; they are 3 in number, fewer than in *B. tentaculata*, in which 4 or 5 are present.